Amendments to the Drawings

The attached sheet of drawings includes changes to Fig. 1. This sheet, which includes Fig. 1, replaces the original sheet including Fig. 1.

Attachment: Replacement Sheets (1).

Remarks

Drawings

The drawings stand objected to because Figure 1 shows unlabeled blank boxes. The drawings also stand objected to because in Figure 9e, component 70 is shown, but this component is not described in the description of Figure 9e. The drawings also stand objected to because page 5, line 29, in the description of Figure 3, refers to "matrix components M_{ij}, however, there are no matrix components M_{ij} shown in Figure 3.

Applicant respectfully submits that Figure 1 has been amended in accordance with the suggestions in the Office Action with respect to:

A) Component 13 has been labeled "Transmit/Receive Unit";

B) Component 14 has been labeled "Processing Unit";

C) Component 15 has been labeled "Control Unit"; and

D) Component 16 has been labeled "Support".

In light of the foregoing amendments, Applicants respectfully requests reconsideration and withdrawal of the objections to Figure 1.

With respect to component 70 in Figure 9e, Applicants respectfully submit that component 70 is adequately described at page 6, line 34 - page 7, line 2 in connection with Figure 9a. Accordingly, Figure 9e has not been amended, nor has the portion of the specification which corresponds to Figure 9e. Reconsideration and withdrawal of the objection to Figure 9e is respectfully requested.

With respect to the "matrix components M_{ij}" not appearing in Figure 3, Applicants respectfully assert that the matrix components M_{ij} are numerical values and are not intended to be shown in Figure 3. Accordingly, reconsideration and withdrawal of the objection to Figure 3 is respectfully requested.

Specification

The disclosure stands objected to because of the following informalities:

A) Page 6, line 24 refers to a figure 8, however there is no figure 8 in the application;

B) Page 6, line 33 refers to a figure 9, however there is no figure 9 in the application; and

C) Page 7, line 7 refers to a figure 8 and a figure 9, however there is no figure 8 or figure 9 in the application.

As suggested by the Office Action, the paragraph beginning at page 6, line 24 has been amended to delete the phrase "Fig. 8 shows" and insert the phrase "Figs. 8a and 8b show".

As suggested by the Office Action, the paragraph beginning at page 6, line 33 has been amended to delete the phrase "Fig. 9 shows" and insert the phrase "Figs. 9a and 9b show".

Finally, as suggested by the Office Action, the paragraph beginning at page 6, line 33 has been amended to delete the phrase "Figs. 8 and 9 show" and insert the phrase "Figs. 8a, 8b, 9a, and 9b show".

In light of the above amendments to the specification, reconsideration and withdrawal of the objection to the disclosure is respectfully requested.

Claims

Claims 1-10 are pending in the present application. Claims 1-3, 5, and 6-10 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Lee (US Patent application Publication 2002/0180439 A1) (Lee). Claims 4 and 6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of Molyneaux *et al.*, (US 5,578,925).

Claim 7 also stands objected to because of the informality that it does not make grammatical sense.

Claims 1-6 and 8-10 remain in the application unamended.

Claim 7 has been amended.

THE PRESENT APPLICATION

The present application is directed, at least in part, to the idea to refrain from hard-wiring the individual RF coils of the RF coil arrays to one another and from operating the coil arrays with a fixed amplitude and phase relationship, and to connect each RF coil to a separate channel of a transmit/receive unit instead, thus enabling separate control of each RF coil. Each RF coil can thus be supplied with a separate excitation pulse (in the transmission mode) and the MR signal received by each RF coil

(in the receiving mode) can be separately evaluated. Each RF coil array includes at least two of such RF coils which are each time decoupled from one another, the RF coil arrays being constructed so as to be planar and being arranged on opposite sides of the examination zone. See, page 2, lines 20-28.

As set forth at page 4, line 10 et seq., Fig. 1 shows a diagrammatic representation of an MR system in accordance with the invention for the formation of MR images of the part of the patient 1 which is situated in an examination zone. The patient 1 is arranged in an open space 2 between two main field magnet poles 3, 4 of a main field magnet. The main field magnet also includes a first and a second equalization plate 5, 6 which generate, in conjunction with the main field magnet poles 3, 4, a homogeneous steady magnetic field B_0 in the examination zone between the main field magnet poles 3, 4, that is in the vertical direction in the drawing. There is also provided a gradient coil system 7, 8 which includes a plurality of gradient coils for generating magnetic gradient fields in the examination zone. An RF coil system with two RF coil arrays 9, 10 is provided in order to generate a magnetic RF field B_1 in a direction which is essentially perpendicular to the steady main magnetic field B_0. Each of said RF coil arrays 9, 10 includes at least two RF coils which can act both as transmit coils for the excitation of the examination zone and as receive coils for the reception of MR signals from the examination zone. RF shields 11, 12 between the neighboring RF coil arrays 9, 10 and the neighboring gradient coils 7, 8 on the other side prevent the coupling in of the magnetic RF field B_1 into the gradient coils 7, 8.

THE LEE REFERENCE

Lee is directed to an apparatus having a near-field radio-frequency planar strip array antenna that can be used for parallel spatial encoded and for conventional series spatial encoded MRI. See, Lee, page 1, paragraph 0001.

More specifically, Lee teaches that the RF excitation and MR signal detection apparatus 520 according to the present invention includes an RF transmitter 522, MR signal detection circuitry 524, transmitter coils 526 and a PSA antenna 100 according to the present invention. The RF transmitter 522 is under the control of the computer 506 so that RF field pulses or signals are selectively generate and applied to the body 2 for

excitation of magnetic resonance in the body. While these RF excitation pulses are being applied to the body T/R switches 224 (FIG. 9A) of the MR signal detection circuitry are actuated so as to de-couple the PSA antenna 100 from the MR signal detection circuitry. Following application of the RF excitation pulses, the T/R switches are again actuated to couple the PSA antenna 100 to the MR signal detection circuitry 524. The PSA antenna 100 detects or senses the MR signals resulting from the excited nuclei in the body and passes the MR signals onto the MR signal detection circuitry 524 (e.g., the receivers 230 thereof. See, Lee, page 9, paragraph 0101 - page 10, paragraph 0102 and Figure 11.

In light of the following, Applicants respecfully submit that Lee does not teach or suggest all of the limitations of claims 1-6, and 8-10.

Claim 1 is directed to an MR system for MR imaging, including: an open main field magnet with two main field magnet poles which are arranged on opposite sides of an examination zone in order to generate a magnetic main field; a gradient coil system with a plurality of gradient coils for generating magnetic gradient fields; an RF coil system for transmitting and/or receiving RF signals with two planar RF coil arrays which are situated on opposite sides of the examination zone, each RF coil array including at least two RF coils which are decoupled from one another and are connected to a respective channel of a transmit/receive unit; a transmit/receive unit which includes a respective channel for an RF coil of the RF coil system, each RF coil being separately controllable in the transmission mode; a control unit for controlling the MR imaging; and a processing unit for processing received MR signals.

Applicants respectfully assert that Lee does not teach or suggest all of the claim limitations of claim 1. As noted above, Lee teaches that RF field signals are applied (via transmitter coils 526) to the body 2 for excitation of magnetic resonance in the body. Following application of the RF excitation pulses, the T/R switches are again actuated to couple the PSA antenna 100 to the MR signal detection circuitry 524. The PSA antenna 100 detects or senses the MR signals resulting from the excited nuclei in the body and passes the MR signals onto the MR signal detection circuitry 524. Accordingly, Lee does not teach or suggest an RF coil system for transmitting and/or receiving RF signals with two planar RF coil arrays which are situated on opposite sides of the examination zone as

set forth in claim 1. Rather, Lee shows that its PSA antenna is situated on a single side of the examination zone. It should also be noted that the Office Action has not established any teaching in Lee that the transmitter coils are array coils as set forth in claim 1. In light of the foregoing, reconsideration and withdrawal of the rejection of claim 1 is respectfully requested.

Claims 2-10 depend from claim 1. For at least the reasons stated above in connection with claim 1, Applicant assert that claims 2-10 are patentable over the prior art of record.

Claim 7 has been amended to delete the phrase "time one" in order to correct the grammatical error noted in the Office Action.

Conclusion

Applicants submit that claims 1-10 distinguish patentably and non-obviously over the prior art of record and are in condition for allowance. An early indication of allowability is earnestly solicited.

If any extension of time is required relative to this Amendment A, Applicants hereby petition for such extension. Authorization to charge deposit account 14-1270 for the fees associated therewith or otherwise necessary in connection with the related application is hereby provided.

Respectfully submitted,

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